

REACTION-FORMING METHOD FOR PRODUCING NEAR NET-SHAPE REFRACTORY METAL CARBIDES

ABSTRACT OF THE DISCLOSURE

A method for reaction forming refractory metal carbides. The method involves the fabrication of a glassy carbon preform by casting an organic, resin-based liquid mixture into a mold and subsequently heat treating it in two steps, which cures and pyrolyzes the resin resulting in a porous carbon preform. By varying the amounts of the constituents in the organic, resin-based liquid mixture, control over the density of the carbon preform is obtained. Control of the density and microstructure of the carbon preform allows for determination of the microstructure and properties of the refractory metal carbide material produced. The glassy carbon preform is placed on a bed of refractory metal or refractory metal - silicon alloy. The pieces are heated above the melting point of the metal or alloy. The molten metal wicks inside the porous carbon preform and reacts, forming the refractory metal carbide or refractory metal carbide plus a minor secondary phase.